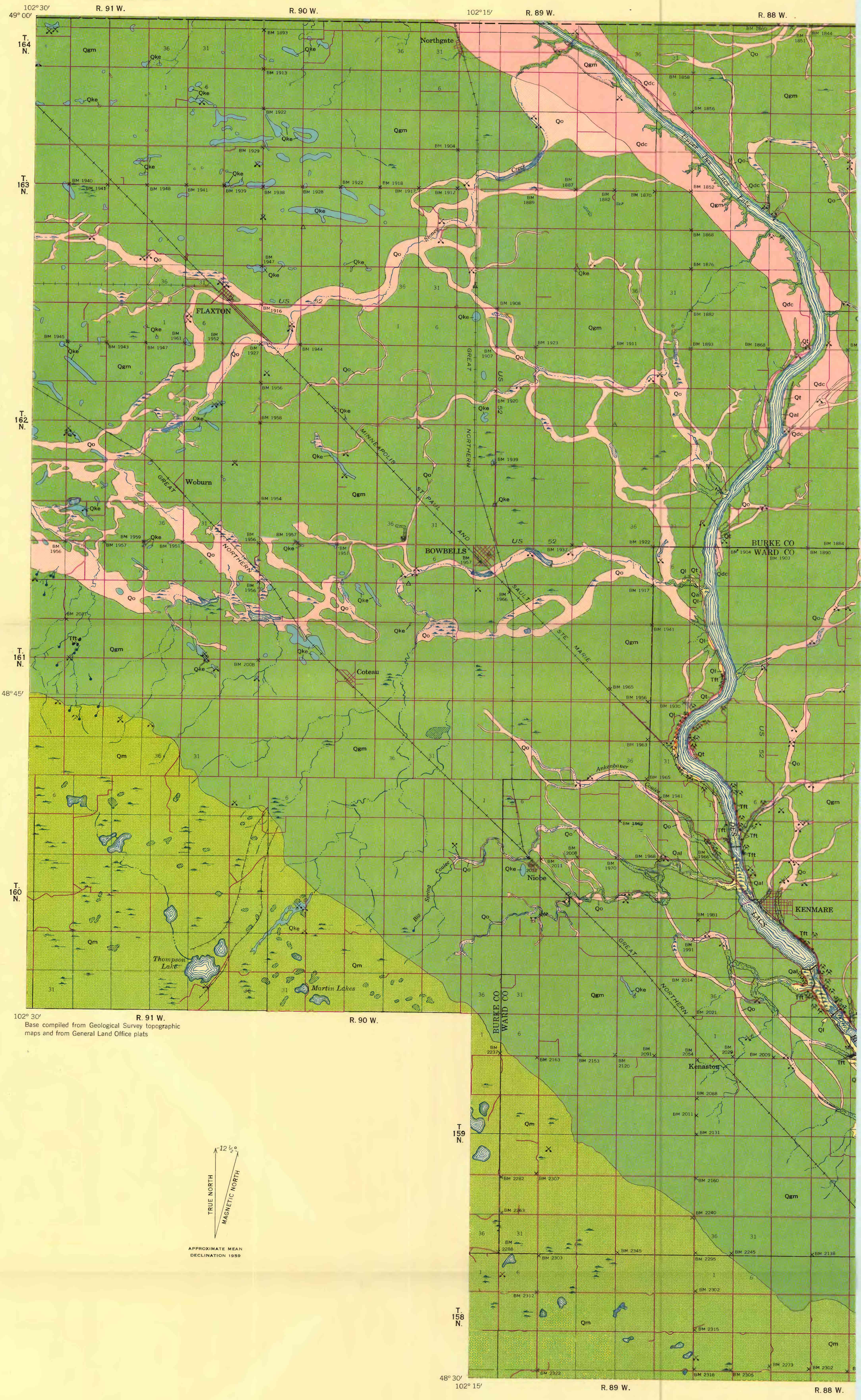
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



Base compiled from Geological Survey topographic maps and from General Land Office plats

EXPLANATION

Recent

Qal

Alluvium

Sand, silt, and clay underlying valley floors of rivers and larger tributaries

Qd

Dune sand

Medium to fine sand in dunes as much as 50 feet high; not mapped where too thin to form distinct dune topography. Gradational contact with glacial Lake Souris deposits (Qgl)

Ql

Landslide deposits

Slump blocks along valley walls and tributaries of Des Lacs River consist chiefly of till and strata of the Fort Union formation. Arcuate slide areas along valley walls of the Souris River consist chiefly of till and stratified drift. Slide deposits, in places, are several tens of feet thick

Pleistocene

Wisconsin stage (Mankato substage)

Qgl

Deposits of glacial Lake Souris

Mostly moderately well to well-sorted sand and silt of glacial Lake Souris. Includes sand and fine gravel of deltaic, beach, and other near-shore deposits. Deposits range in thickness from a feather edge to more than 70 feet. In places, includes small patches of till where thin lake deposits have been removed by wind or fluvial erosion. Contact with ground moraine (Qgm) is approximate shoreline at highest stage of lake

Qgf

Glacio-fluvial deposits undifferentiated

Consists chiefly of sand, gravel, and some silt. In most places about 15 feet thick. Modes of origin of deposits are not clear

Qo

Ice-marginal outwash-channel deposits

Gravel, sand, silt, and clay deposited by glacial melt water in ice-marginal channels in till. Deposits range in thickness from a few inches to 20 feet. Includes recent alluvium deposited by small intermittent streams incised in floors of channels and slope wash from channel walls. Where deposits are very thin, contact is arbitrarily placed along channel wall

Qem

End moraines in Souris loop area

Northern parts of moraines consist predominantly of ice-contact sand and fine gravel; till is more abundant in southern parts of some deposits and in low intervening areas between knobs and ridges. Deposits range in height from indistinct knobs and ridges to prominent features 100 feet high

Qke

Kames and eskers

Mounds and sinuous ridges, generally 10 to 20 feet high, that consist chiefly of poorly sorted gravel, sand, silt, and minor amounts of till; boulders locally abundant

Qt

River-terrace deposits

Terrace deposits of poorly to well-sorted sand, gravel, and boulders along valley walls of Souris River and Des Lacs River. Deposits range in thickness from a feather edge to more than 50 feet

Qdc

Diversion-channel deposits

Consist chiefly of moderately well sorted fine to medium gravel, sand, and silt deposited in channels cut by melt water that was diverted by ice from the valley of the Souris River. In places 30 or more feet thick but generally 5 to 15 feet thick

Qr

Linear-ridge deposits

Long linear parallel ridges, mostly 5 to 15 feet high, that consist of sand, silt, till and lesser amounts of gravel. Some boulders, concentrated chiefly on surface of ridges

Qic

Overridden ice-contact deposits

Discontinuous ice-contact deposits of sand and fine gravel along valley walls of Souris River. In most places overlain and underlain by till. In a few places as much as 30 feet thick but generally 5 to 15 feet thick

Qgm

Ground moraine

Chiefly nearly impervious stony clay till. In most places, ranges from 50 to 200 feet in thickness. Includes till of pre-Mankato age exposed below a boulder belt (see symbol below for boulder belt) in northern part of Tagus quadrangle and probably also underlying till of Mankato substage in other places. Small deposits of Recent alluvium and colluvium deposited in numerous kettles and other undrained depressions on the ground moraine surface are not differentiated from ground moraine

Qm

Max moraine

Chiefly nearly impervious stony clay till, generally more than 100 feet thick, having a very uneven surface characterized by knobs, irregular ridges, and kettles and other undrained depressions. Some untested knobs may be kames. Probably includes unexposed till of Iowan, Tazewell, and Cary substages

Deposits are almost contemporary in age; units arranged approximately in order of deposition

QUATERNARY

Paleocene

Fort Union formation

Tft

Tongue River member

Continental beds of poorly to moderately consolidated sandstone, sand, siltstone, shaly clay, and lignite. Weathered exposures are mostly gray to tan. Solid pattern shows individual exposure or area of closely spaced outcrops

Tfc

Cannonball member

Thinly bedded marine fossiliferous sand and sandy shale

TERTIARY